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PATENT & TRADEMARK OFFICE

MAIL STOP APPEAL BRIEF - PATENTS

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant:	A.F. Champernowne	Attorney Docket No. EXIN117029
Application No.:	09/825,451	Group Art Unit: 3629
Filed:	April 2, 2001	Examiner: J.A. Mooneyham
Title:	OPTIMIZED SYSTEM AND METHOD FOR FINDING BEST FARES	

TRANSMITTAL OF APPEAL BRIEF

Seattle, Washington 98101

May 16, 2005

TO THE COMMISSIONER FOR PATENTS:

Enclosed herewith for filing in the above-identified application is an Appeal Brief.

Also enclosed is our Check No. 163586 in the amount of $500.00.

The Commissioner is hereby authorized to charge any fees under 37 C.F.R. §§ 1.16, 1.17 and 1.18 which may be required during the entire pendency of the application, or credit any overpayment, to Deposit Account No. 03-1740. This authorization also hereby includes a request for any extensions of time of the appropriate length required upon the filing of any reply during the entire prosecution of this application. A copy of this sheet is enclosed.

Respectfully submitted,

CHRISTENSEN O'CONNOR
JOHNSON KINDNESS PLLC

Tracy S. Powell

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I hereby certify that this correspondence is being deposited with the U.S. Postal Service in a sealed envelope as first class mail with postage thereon fully prepaid and addressed to Mail Stop Appeal Brief - Patents, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on the below date.

Date: May 16, 2005 Lori A. Lewis

TSP:lal

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MAIL STOP APPEAL

BRIEF - PATENTS

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Applicant:	A.F. Champernowne	Attorney Docket No. EXIN117029
Application No:	09/825,451	Group Art Unit: 3629
Filed:	April 2, 2001	Examiner: J.A. Mooneyham
Title:	OPTIMIZED SYSTEM AND METHOD FOR FINDING BEST FARES	

APPEAL BRIEF

Seattle, Washington

May 16, 2005

TO THE COMMISSIONER FOR PATENTS:

This brief is in support of a Notice of Appeal for the above-identified application, filed March 14, 2005, to the Board of Patent Appeals and Interferences, appealing the decision dated December 14, 2004, of the Primary Examiner's rejections of Claims 1-36.

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I. REAL PARTY IN INTEREST

The subject application is owned by Expedia, Inc., of Bellevue, Washington.

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II. RELATED APPEALS AND INTERFERENCES

Upon information and belief, Appellant does not have any knowledge of related appeals or interferences that may directly affect or have a bearing on the decision of the Board of Appeals and Interferences (hereinafter "the Board") in the pending appeal.

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III. STATUS OF CLAIMS

On April 2, 2001, Appellant filed the pending patent application including Claims 1-36. On July 2, 2003, the Examiner issued a first Office Action rejecting Claims 1-36. On October 28, 2003, Appellant filed an Amendment and Response in which Claims 1, 2 and 13-26 were amended. On February 10, 2004, the Examiner issued a second Office Action, finally rejecting Claims 1-36. On May 10, 2004, Appellant concurrently filed a Notice of Appeal and an Amendment and Response After Final Rejection in which Appellant amended Claims 1 and 25.

On June 22, 2004, the Examiner issued an advisory action stating that the amendments filed in the Amendment and Response After Final Rejection of May 10, 2004, would not be entered. On November 5, 2004, a Request for Continued Examination was entered, resubmitting the Amendment and Response of May 10, 2004. On December 14, 2004, the Examiner issued an Office Action entering the amendments of May 10, 2004, but again rejecting Claims 1-36. Appellant, on March 14, 2005, filed a new Notice of Appeal.

This Appeal follows in which Appellant entreats the Board to reverse the rejection of Claims 1-36. The claims on appeal are set forth in Appendix VIII.

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IV. STATUS OF AMENDMENTS

There are no outstanding amendments to this application.

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V. SUMMARY OF CLAIMED SUBJECT MATTER

The present invention is directed towards finding the best air fares available for a potential traveler/customer in a computationally non-prohibitive manner in response to a fare request from a customer. The following background and the discussions of the disclosed embodiments of Appellant's invention are not provided to define the scope or interpretation of any of the appealed claims. In order to find the best air fares available for a potential traveler/customer in a computationally non-prohibitive manner in response to a fare request from a customer, the present invention utilizes a fare solution tree.

A. Summary of Exemplary Subject Matter

A solution tree is a tree structure of fare solutions where each upper level in the solution tree includes partial fare solutions from the preceding level plus an additional element of information required to, at the final leaf nodes, create complete fare solutions. However, in the present invention, only optimal partial solutions from the preceding level are combined with an additional element to populate the next level of the solution tree. Optimal partial fare solutions are those solutions that are "optimal" according to certain criteria. This criteria may include price, whether a flight is a direct flight, departure time, etc.

As indicated above, at each level, an additional element of information is added to nodes (only nodes with optimal partial fare solutions) in previous levels. In this manner complete fare solutions are built, beginning with a partial fare solution at the root node of the solution tree, to complete fare solutions at the solution tree's leaf nodes. In other words, at each level in the solution tree, more trip information is added to the previous level's partial fare solutions, such that fare solutions of each subsequent level are more complete solutions than those of the previous level.

As an example, the partial fare solution at the root node, the root level, typically includes the origin and destination as requested by a consumer. At the first level from the root node level, the query server generates new partial fare solutions (nodes) in the solution tree by adding breakpoint information to the root node. Breakpoints are discrete routes between the origin and destination including identifiable segments. These breakpoints/routes represent all of the various "paths" that a traveler might take between the origin and destination specified in the fare request. After generating the first level of partial fare solutions, a second level of partial fare solution nodes are created in the solution tree by adding additional trip information, such as carrier data, to the previous partial fare solutions. A third level in the solution tree may then be created by assigning specific flights to the previous level's partial fare solutions. This process continues, with each iteration creating new levels in the solution tree, until all trip information is added, whereupon the leaf nodes are no longer partial fare solutions, but rather are complete fare solutions.

Without other action, by adding additional information to partial fare solutions of previous levels, the number of nodes in the solution tree grows exponentially, and generating the resulting complete fare solutions in the solution tree would be computationally prohibitive, especially in a dynamic, on-the-fly manner. However, in addition to the additive process described above, i.e., as trip information is added to partial fare solutions, partial fare solutions that are determined to be non-optimal are not processed any further in the solution tree. In other words, if a node is determined to non-optimal, information is not added to that node in the next level. By not processing non-optimal partial fare solutions from lower levels of the solution tree, the growth of the fare solution tree is minimized, and when all information is added, only optimal complete fare solutions are generated.

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Determining whether a partial fare solution is optimal can be accomplished with a variety of manners based on the consumer's request/query. For example, after a threshold price, based on previous samplings of fares between the origin and destination, has been established, any partial fare solution that exceeds that threshold price need not be further processed to completion. Alternatively, if a nonstop flight is requested between an origin and destination, those partial fare solutions that include more than one flight segment would be excluded from further processing. Combinations of various criteria may be used to determine optimality.

By evaluating the partial fare solutions to determine whether it is optimal or not, and not processing the non-optimal partial fare solutions any further, it can be said that all complete fare solutions are at least implicitly examined. In other words, all possible complete fare solutions are not explicitly examined because not all complete fare solutions are built. However, those that are not built are implicitly examined because, prior to completion, they have been determined to be non-optimal fare solutions and would remain non-optimal if processed to complete fare solutions.

B. Support for Claimed Subject Matter in the Specification

1. Claims 1-12

Independent Claim 1 is directed at a method for finding at least one best fare for a trip. The method comprises, at a query server in response to a fare query from a client computer, determining a set of partial fare solutions for the trip. (Specification, pg. 16, lines 27-31.) Trip information is added to the set of partial fare solutions in order to define a set of complete fare solutions. (Specification, pg. 19, lines 20-30.) As trip information is added to the partial fare solutions, partial fare solutions that are non-optimal partial solutions are eliminated. (Specification, pg. 21, line 31 - pg. 22, line 2.) Thereafter, a subset of said complete fare solutions as the best fares for the trip is returned. (Specification, pg. 21, lines 19-21.)

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Claims 2-12 are dependent from Claim 1, and are directed to the following additional recitations. Claim 2 recites that adding trip information to the partial fare solutions comprises: supplying the fare query to a root node in a solution tree; assigning fare components corresponding to said root node to a plurality of first nodes; assigning at least one carrier corresponding to said first nodes to a plurality of second nodes; assigning at least one flight corresponding to said second nodes to a plurality of third nodes; assigning at least one priceable unit corresponding to said third nodes to a plurality of fourth nodes; and assigning at least one fare corresponding to said fourth nodes to a plurality of leaf nodes. (Specification, pg. 27, line 9 - pg. 28, line 12.) Claim 3 recites that the subset of complete fare solutions is a predetermined number of lowest cost fare solutions. (Specification, pg. 28, lines 19-23.) Claim 4 recites that subset of complete fare solutions is an exhaustive set of said complete fare solutions. (Specification, pg. 30, original Claim 4.)

Claim 5 recites that adding trip information and eliminating partial fare solutions are performed in a recursive manner. (Specification, pg. 29, lines 20-25.) Claim 6 recites that adding trip information and eliminating partial fare solutions are performed in an iterative manner. (Specification, pg. 29, lines 20-25.) Claim 7 recites that the partial fare solutions are eliminated based on a threshold cost. (Specification, pg. 27, lines 24-26.) Claim 8 recites that the partial fare solutions are eliminated based on a refined lower bound. (Specification, pg. 18, lines 1-10.) Claim 9 recites that the partial fare solutions are stored in a priority queue. (Specification, pg. 11, lines 21-27.) Claim 10 recites that the complete fare solutions are retrieved from a priority queue. (Specification, pg. 11, lines 21-27.) Claim 11 recites that adding trip information and eliminating partial fare solutions are performed as part of a branch-and-bound best fare search routine. (Specification, pg. 16, lines 19-26.) Claim 12 recites

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that adding trip information and eliminating partial fare solutions are performed both backward and forward from a destination and origin. (Specification, pg. 29, lines 9-25.)

2. Claims 13-24

Independent Claim 13 is directed at a computer-readable medium containing computer-executable instructions. When executed on a computing device, the instructions carry out a method for finding at least one best fare for a trip. The method comprises determining a set of partial fare solutions for the trip. (Specification, pg. 16, lines 27-31.) Trip information is added to the set of partial fare solutions in order to define a set of complete fare solutions. (Specification, pg. 19, lines 20-30.) As trip information is added to the partial fare solutions, partial fare solutions that are non-optimal partial solutions are eliminated. (Specification, pg. 21, line 31 - pg. 22, line 2.) Thereafter, a subset of said complete fare solutions as the best fares for the trip is returned. (Specification, pg. 21, lines 19-21.)

Claims 14-24 are dependent from Claim 13, and are directed to the following additional recitations. Claim 14 recites that adding trip information to the partial fare solutions comprises: supplying the fare query to a root node in a solution tree; assigning fare components corresponding to said root node to a plurality of first nodes; assigning at least one carrier corresponding to said first nodes to a plurality of second nodes; assigning at least one flight corresponding to said second nodes to a plurality of third nodes; assigning at least one priceable unit corresponding to said third nodes to a plurality of fourth nodes; and assigning at least one fare corresponding to said fourth nodes to a plurality of leaf nodes. (Specification, pg. 27, line 9 - pg. 28, line 12.) Claim 15 recites that the subset of complete fare solutions is a predetermined number of lowest cost fare solutions. (Specification, pg. 28, lines 19-23.) Claim 16 recites that subset of complete fare solutions is an exhaustive set of said complete fare solutions. (Specification, pg. 30, original Claim 4.)

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Claim 17 recites that adding trip information and eliminating partial fare solutions are performed in a recursive manner. (Specification, pg. 29, lines 20-25.) Claim 18 recites that adding trip information and eliminating partial fare solutions are performed in an iterative manner. (Specification, pg. 29, lines 20-25.) Claim 19 recites that the partial fare solutions are eliminated based on a threshold cost. (Specification, pg. 27, lines 24-26.) Claim 20 recites that the partial fare solutions are eliminated based on a refined lower bound. (Specification, pg. 18, lines 1-10.) Claim 21 recites that the partial fare solutions are stored in a priority queue. (Specification, pg. 11, lines 21-27.) Claim 22 recites that the complete fare solutions are retrieved from a priority queue. (Specification, pg. 11, lines 21-27.) Claim 23 recites that adding trip information and eliminating partial fare solutions are performed as part of a branch-and-bound best fare search routine. (Specification, pg. 16, lines 19-26.) Claim 24 recites that adding trip information and eliminating partial fare solutions are performed both backward and forward from a destination and origin. (Specification, pg. 29, lines 9-25.)

3. Claims 25-36

Independent Claim 25 is directed at a query server apparatus in a communication network finding at least one best fare for a trip. The query server apparatus comprises a processor and a memory coupled to the processor. The memory stores program code, which when executed in response to a fare query, causes the apparatus to perform the following: determining a set of partial fare solutions for the trip. (Specification, pg. 16, lines 27-31.) Trip information is added to the set of partial fare solutions in order to define a set of complete fare solutions. (Specification, pg. 19, lines 20-30.) As trip information is added to the partial fare solutions, partial fare solutions that are non-optimal partial solutions are eliminated. (Specification, pg. 21, line 31 - pg. 22, line 2.) Thereafter, a subset of said complete fare solutions as the best fares for the trip is returned. (Specification, pg. 21, lines 19-21.)

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Claims 26-36 are dependent from Claim 25, and are directed to the following additional recitations. Claim 26 recites that adding trip information to the partial fare solutions comprises: supplying the fare query to a root node in a solution tree; assigning fare components corresponding to said root node to a plurality of first nodes; assigning at least one carrier corresponding to said first nodes to a plurality of second nodes; assigning at least one flight corresponding to said second nodes to a plurality of third nodes; assigning at least one priceable unit corresponding to said third nodes to a plurality of fourth nodes; and assigning at least one fare corresponding to said fourth nodes to a plurality of leaf nodes. (Specification, pg. 27, line 9 - pg. 28, line 12.) Claim 27 recites that the subset of complete fare solutions is a predetermined number of lowest cost fare solutions. (Specification, pg. 28, lines 19-23.) Claim 28 recites that subset of complete fare solutions is an exhaustive set of said complete fare solutions. (Specification, pg. 30, original Claim 4.)

Claim 29 recites that adding trip information and eliminating partial fare solutions are performed in a recursive manner. (Specification, pg. 29, lines 20-25.) Claim 30 recites that adding trip information and eliminating partial fare solutions are performed in an iterative manner. (Specification, pg. 29, lines 20-25.) Claim 31 recites that the partial fare solutions are eliminated based on a threshold cost. (Specification, pg. 27, lines 24-26.) Claim 32 recites that the partial fare solutions are eliminated based on a refined lower bound. (Specification, pg. 18, lines 1-10.) Claim 33 recites that the partial fare solutions are stored in a priority queue. (Specification, pg. 11, lines 21-27.) Claim 34 recites that the complete fare solutions are retrieved from a priority queue. (Specification, pg. 11, lines 21-27.) Claim 35 recites that adding trip information and eliminating partial fare solutions are performed as part of a branch-and-bound best fare search routine. (Specification, pg. 16, lines 19-26.) Claim 36 recites

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that adding trip information and eliminating partial fare solutions are performed both backward and forward from a destination and origin. (Specification, pg. 29, lines 9-25.)

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VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

In the December 14, 2004, Office Action (hereinafter "Office Action"), the Examiner made the following rejections which are herewith set forth for review:

A. Ground 1: Claims 1, 3, 9, 10, 13, 15, 21, 22, 25, 27, 33, and 34 were rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 6,295,521 to DeMarcken *et al.* (hereinafter "DeMarcken *et al.*");

B. Ground 2: Claims 2, 14, and 26 were rejected under 35 U.S.C. § 103(a) as being unpatentable in view of to DeMarcken *et al.*;

C. Ground 3: Claims 4-8, 11, 12, 16-20, 23, 24, 28-32, 35, and 36 were rejected under 35 U.S.C. § 103(a) as being unpatentable over DeMarcken *et al.* and International Publication No. WO 01/29693 to Sabre Inc. (hereinafter "Sabre").

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VII. ARGUMENT

Prior to presenting appellant's arguments as to why Appellant believes that the Examiner's rejections of Claims 1-36 are in error and should be overturned, a brief description of the cited and applied references is presented.

A. Summary of Cited References

1. DeMarcken *et al.* (U.S. Patent No. 6,295,521)

DeMarcken *et al.* present an airline travel planning system including a server computer that, in response to a search request, generates a set of **complete** pricing solutions, including **both** optimal and non-optimal pricing solutions. This set of complete pricing solutions is then stored in a data structure, more specifically, a directed acyclical graph (DAG), frequently referred to in DeMarcken *et al.* as the pricing graph. (See DeMarcken *et al.*, Abstract, Col. 5, lines 36-41.) The complete set of pricing solutions, stored in the pricing graph, including both optimal and non-optimal solutions, are returned to a client computer. (*DeMarcken et al.*, Col. 5, lines 46-50.) Once the client computer has the pricing graph/DAG, the complete set of pricing solutions can be locally manipulated according to user preferences, including "enumerat[ing] pricing solutions from the directed acyclical graph (DAG) representation." (DeMarcken *et al.*, Col. 5, lines 48-50.)

Thus, in clear contrast to the present invention, DeMarcken *et al.* generate a set of complete pricing solutions, where the "typical number of set[s] of pricing solutions represented by [the] pricing graph ranges from tens of millions into hundreds of billions", (DeMarcken *et al.*, Col. 49, lines 19-23), store them in the pricing graph, and forwards the complete pricing solutions to the client computer. Only after the numerous complete pricing solutions are generated and stored in the pricing graph, and at the client computer, is the pricing graph manipulated to find the lowest pricing solutions contained within.

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2. Sabre (International Publication No. WO 01/29693)

Sabre purportedly discloses a method for searching for low fares using a virtual network. The virtual network is constructed from the paths between a specified origin and destination. The paths may include intermediate locations (i.e., non-direct flights between the origin and destination), which are included in the virtual network. Once constructed, the various paths in the virtual network represent **complete** fare solutions, including both optimal and non-optimal fare solutions.

After Sabre's virtual network is constructed, various fare information can be extracted from the virtual network, including the lowest fares between an origin and destination. To extract the lowest fares between the origin and destination from the virtual network, the Sabre system employs various algorithms which, in essence, add up the costs of the various segments of each complete fare solution between the origin and destination. By determining the costs for each complete fare solution, and comparing the costs of complete fare solutions, the Sabre system can identify which solutions represent the optimal, lowest price fare solutions.

Obviously, Sabre constructs and stores both optimal and non-optimal fare solutions in the virtual network. If Sabre constructed only optimal fare solutions, Sabre would have no reason to provide algorithms to extract the optimal solutions from the virtual network. Indeed, Sabre is similar to DeMarcken *et al.* in that complete fare solutions, including both optimal and non-optimal solutions, are generated and stored in a storage structure. According to Sabre and DeMarcken *et al.*, after both optimal and non-optimal solutions are constructed the optimal fare solutions can be identified. In contrast to Sabre and DeMarcken *et al.*, according to the present invention, only optimal fare solutions are processed to completion. Accordingly, the present invention does not require an extraction (or enumeration) process to identify which, of all complete fare solutions, are optimal fare solutions.

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B. Arguments for Appeal

1. Rejection of Claims 1, 3, 9, 10, 13, 15, 21, 22, 25, 27, 33, and 34 Under 35 U.S.C. § 102(e)

a) Claims 1, 13, and 25

Claims 1, 13, and 25 were rejected in the Office Action under 35 U.S.C. § 102(e) as being anticipated by DeMarcken *et al.* More specifically, it is asserted in the Office Action that DeMarcken *et al.* teach, at the server computer, "determining a set of partial fare solutions for the trip," "adding trip information to the partial fare solutions in order to define a set of complete fare solutions for the trip," and "as trip information is added to the partial fare solutions, eliminating partial fare solutions that are non-optimal partial solutions." Applicant respectfully disagrees.

(1) DeMarcken *et al.* Fail to Teach Determining a Set of Partial Fare Solutions

Applicant respectfully asserts that DeMarcken *et al.* fail to teach, at the server computer, "determining a set of partial fare solutions for the trip" as recited in Claims 1, 13, and 25. DeMarcken *et al.* disclose that, as a first step in responding to a user query, the query is given to a scheduler process that "produces a large number of itineraries" for the journey. (DeMarcken *et al.*, Col. 4, lines 52-53.) DeMarcken *et al.* further disclose that the scheduler process uses various computer reservation systems (CRS), such as Sabre, Apollo, Amadeus, and WorldSpan, to produce the itineraries. (DeMarcken *et al.*, Col. 4, lines 55-60.) Those skilled in the art will recognize that the itineraries received from a CRS are complete travel solutions, describing in detail the flights, segments, etc., between a specified origin and destination. DeMarcken *et al.* also similarly describe the itineraries produced by the CRS systems as complete solutions. (DeMarcken *et al.*, Col. 1, lines 26-42.) Thus, in contrast to Claims 1, 13,

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and 25, DeMarcken *et al.* teaches first obtaining a set of complete travel solutions from the described scheduling process. (DeMarcken *et al.*, Col. 4, lines 52-55.)

Col. 51 - Finding the Best Price, and Col. 55, lines 54-56 of DeMarcken *et al.* are cited in the Office Action in support of the assertion that the cited reference teaches "determining a set of partial fare solutions." However, the so-called "partial pricing-solutions" in the cited passages are nothing more than intermediate states or placeholders for extracting information regarding the *complete* solutions already existing in the pricing graph. They are not "a set of partial fare solutions" to which trip information is ultimately added, which brings us to the next distinction between independent Claims 1, 13, and 25, and DeMarcken *et al.*

(2) DeMarcken *et al.* Fail to Teach Adding Trip Information to Partial Fare Solutions

Applicant respectfully asserts that DeMarcken *et al.* fail to teach "adding trip information to the partial fare solutions in order to define a set of complete fare solutions for the trip," as recited in Claims 1, 13, and 25. As noted above, the "partial-solutions" of DeMarcken *et al.*, Col. 55, lines 54-56, refer to temporary place holders to locations in the pricing graph that are used for **extracting** information regarding *complete* solutions **from** the pricing graph. None of the passages in DeMarcken *et al.* cited in the Office Action describe **adding** trip information **to** *partial* fare solutions in order to **define** *complete* fare solutions.

Moreover, DeMarcken *et al.* fail to disclose any additive process whatsoever for defining complete solutions. Rather, DeMarcken *et al.* disclose a "faring process 18," and an "availability system 58," that are used after retrieving the set of itineraries (i.e., complete solutions) from the CRS systems. The faring process and the availability system are used to determine whether all of the itineraries (i.e., complete solutions) retrieved from the CRS are still available to the consumer. (DeMarcken *et al.*, Col. 5, lines 1-13.) Thus, after a set of complete trip solutions has

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been generated, those complete solutions for fares that are no longer available, or for flights that have no available seats, are removed from the set. The remaining complete solutions are then stored in the pricing graph 38, for efficient storage and transmission to users. In other words, DeMarcken *et al.* describe retrieving numerous *complete* travel solutions, and then removing those complete solutions that don't actually exist. In contrast, Claims 1, 13, and 25 recites a building process, and, in particular, "adding trip information to the partial fare solutions in order to define a set of complete fare solutions for the trip."

(3) DeMarcken *et al.* Fail to Teach Eliminating Partial Fare Solutions That Are Non-Optimal as Trip Information Is Added

Applicant respectfully asserts that DeMarcken *et al.* also fail to teach "as trip information is added to the partial fare solutions, eliminating partial fare solutions that are non-optimal partial solutions," as recited in Claims 1, 13, and 25. In fact, applicant asserts that DeMarcken *et al.* disclose the opposite of "eliminating partial fare solutions that are non-optimal partial fare solutions."

DeMarcken *et al.* disclose that, as a first step in providing fare solutions to a client, **the typical number of pricing solutions generated by the scheduler process "ranges from tens of millions into hundreds of billions."** (DeMarcken *et al.*, Col. 49, lines 19-23.) As the number of pricing solutions generated by the DeMarcken *et al.* scheduler process is so massive, they are compressed into a directed acyclical graph (DAG.) (DeMarcken *et al.*, Col. 5, lines 36-45.) However, it should be understood that this DAG is merely a compressed representation of the tens of millions to hundreds of billions of complete solutions generated by the scheduler process, which complete solutions include **both** optimal and non-optimal solutions. (DeMarcken *et al.*, Col. 49, lines 20-28.) Then, after generating the massive amount of all pricing solutions and storing them in the DAG, the DAG (including the tens of millions, or more,

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fare solutions) is delivered to a client computer with a client process that is able to manipulate the DAG in order to extract particular pricing solutions "in accordance with user specified parameters." (DeMarcken *et al.*, Col. 49, lines 41-42.) **In sum, DeMarcken *et al.* first generates tens of millions to hundreds of billions of complete fare solutions, after which a client process extracts the desirable, "optimal" complete fare solutions from them.**

Clearly, DeMarcken *et al.* fail to disclose removing non-optimal *partial* solutions "**as trip information is added** to the partial fare solutions," as recited in Claim 1. Indeed, if DeMarcken *et al.* system were to remove non-optimal partial solutions as trip information is added, (a) the DeMarcken *et al.* system would not typically generate "tens of millions to hundreds of billions" of complete fare solutions, (b) would not need to store the solutions in a compressed storage structure (the DAG) as there are only a few optimal solutions, and (c) would not need to provide a client process to extract the optimal complete fare solutions from the tens of millions of complete solutions it has generated. Furthermore, to assert that there are tens of millions to hundreds of billions of "optimal" complete fare solutions is simply illogical.

In contrast to DeMarcken *et al.*, and as recited in Claims 1, 13, and 25, non-optimal partial fare solutions are removed by the claimed invention as trip information is added. As such, only optimal complete fare solutions are generated. Accordingly, a compressed storage structure, as disclosed by DeMarcken *et al.*, is unnecessary. Similarly, a client process to extract optimal solutions from the storage structure is also superfluous to the present invention. Clearly, the DeMarcken *et al.* method and system for extracting pricing solutions is fundamentally and patentably distinct from the claimed method and system for finding a best fare.

For the reasons described above, applicant respectfully submits that DeMarcken *et al.* fail to disclose each element of independent Claims 1, 13, and 25. Accordingly, applicant

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respectfully requests that the 35 U.S.C. § 102(e) rejections of Claims 1, 13, and 25 be withdrawn, and the claims allowed.

b) Claims 3, 15, and 27

Claims 3, 15, and 27 were rejected under 35 U.S.C. § 102(e) as being anticipated by DeMarcken *et al.* More specifically, it is asserted that DeMarcken *et al.* discloses "wherein said subset of complete fare solutions is a predetermined number of lowest cost fare solutions." Applicant respectfully disagrees with this assertion.

The Office Action refers to DeMarcken *et al.*, Col. 2, lines 31-37, and Col. 4, lines 30-41, for support of the § 102(e) rejection. However, while both passages appear to indicate that the pricing graph 38 (also referred to as pricing solution 38) can be manipulated to extract complete solutions stored within, neither passage of DeMarcken *et al.* discloses that the subset of complete fares solutions returned to the consumer is **a predetermined number** of lowest cost fare solutions.

Further, Claims 3, 15, and 27, depend from independent Claims 1, 13, and 25, respectively. Accordingly, for the same reasons described above in regard to Claims 1, 13, and 25, applicant asserts that DeMarcken *et al.* also fail to disclose each element of these dependent claims when read in conjunction with the independent claims from which they depend.

For the above described reasons, applicant asserts that DeMarcken *et al.* fail to disclose each element of Claims 3, 15, and 27. Accordingly, applicant requests that the 35 U.S.C. § 102(e) rejection of Claims 3, 15, and 27, be withdrawn, and the claims allowed.

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c) Claims 9-10, 21-22, and 33-34

Claims 9-10 depend from independent Claim 1, Claims 21-22 depend from independent Claim 13, and Claims 33-34 depend from independent Claim 25. For the same reasons described above in regard to independent Claims 1, 13, and 25, applicant asserts that DeMarcken *et al.* fail to disclose each element of these dependent claims, especially when read in conjunction with the independent claims from which they depend. Therefore, applicant requests that the 35 U.S.C. § 102(e) rejection of Claims 3, 9-10, 21-22, 27, and 33-34 be withdrawn, and the claims allowed.

2. Rejections of Claims 2, 4-8, 11, 12, 14, 16-20, 23, 24, 26, 28-32, 35, and 36 Under 35 U.S.C. § 103(a)

a) Claims 2, 14, and 26

Claims 2, 14, and 26, were rejected under 35 U.S.C. § 103(a) as being obvious in view of DeMarcken *et al.* More particularly, it is stated in the Office Action that while DeMarcken *et al.* do not disclose "assigning the fare components to a plurality of first nodes, at least one carrier to a plurality of second nodes, at least one flight corresponding to a plurality of third nodes, assigning at least one priceable unit to a plurality of fourth nodes, and assigning at least one fare component corresponding to a plurality of leaf nodes," a data structure (presumably the pricing graph) can be manipulated "to **extract** a plurality of pricing solutions." Accordingly, it is asserted in the Office Action that it would have been obvious to one of ordinary skill in the art that DeMarcken *et al.*'s system could be arranged according to the assignment of nodes claimed in these dependent claims.

As described above, applicant respectfully disagrees that DeMarcken *et al.* disclose the method and system of independent Claims 1, 13, and 25, from which Claims 2, 14, and 26 depend, respectively.

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Applicant agrees with the Examiner that DeMarcken *et al.* does not disclose the sequence recited in Claims 2, 14, and 26 for adding trip information to partial fare solutions to create complete fare solutions. In fact, as described above, DeMarcken *et al.* completely fail to disclose, teach, or suggest the process of **adding** trip information to *partial* fare solutions **to define** *complete* fare solutions in the first place. Instead, DeMarcken *et al.* discloses a process of obtaining *complete* solutions (itineraries) from a CRS system, and storing them in the pricing graph, which, according to DeMarcken *et al.*, may be subsequently manipulated "to **extract** a plurality of pricing solutions". (DeMarcken *et al.*, Col. 2, lines 38-51, emphasis added.)

Furthermore, as DeMarcken *et al.* disclose a system that gathers and stores *complete* solutions in a pricing graph, and that is subsequently manipulated "to **extract** a plurality of pricing solutions." DeMarcken *et al.* fail to disclose, teach, or suggest a system of **adding** trip information to partial fare solutions, and in particular, adding "fare components to a plurality of first nodes, at least one carrier to a plurality of second nodes, at least one flight corresponding to a plurality of third nodes, assigning at least one priceable unit to a plurality of fourth nodes, and assigning at least one fare component corresponding to a plurality of leaf nodes." Clearly, DeMarcken *et al.* teach away from the present invention, in particular, disclosing a **subtractive** process (extracting solutions from a pricing graph) rather than an **additive** process (building only optimal fare solutions). Accordingly, applicant asserts that it would neither be possible or obvious to one of ordinary skill in the art to arrange the DeMarcken *et al.* system according to the elements of Claims 2, 14, and 26.

For the above described reasons, applicant asserts that DeMarcken *et al.* fail to teach or suggest each element of dependent Claims 2, 14, and 26. Moreover, applicant asserts that DeMarcken *et al.* teach away from the elements recited in Claims 2, 14, and 26. Accordingly,

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applicant respectfully requests that the 35 U.S.C. § 103(a) rejection of Claims 2, 14, and 26 be withdrawn, and the claims allowed.

b) Claims 4-8, 11-12, 16-20, 23-24, 28-32, and 35-36

Claims 4-8, 11-12, 16-20, 23-24, 28-32, and 35-36 were rejected under 35 U.S.C. § 103(a) as being unpatentable over DeMarcken *et al.* in further view of Sabre. Applicant respectfully disagrees.

Claims 4-8, 11-12, 16-20, 23-24, 28-32, and 35-36 each depend from one of independent Claims 1, 13, or 25, and must be read in combination with the independent claims from which they depend. Therefore, applicant asserts that DeMarcken *et al.* fail to teach or suggest each element of these dependent claims for the same reasons described above in regard to independent Claims 1, 13, and 25. Accordingly, applicant requests that the 35 U.S.C. § 103(a) rejections of Claims 4-8, 11-12, 16-20, 23-24, 28-32, and 35-36 be withdrawn, and the claims allowed.

Dependent Claims 4-8, 11-12, 16-20, 23-24, 28-32, and 35-36 include a myriad of recitations not disclosed, taught, or suggested by any of the cited and applied references, either alone or in combination, particularly when these recitations are considered in combination with the recitations of the independent claims from which they depend. Some of these further distinguishing recitations are described below.

(1) Claims 4, 16, and 28

Claims 4, 16, and 28, were rejected under 35 U.S.C. § 103(a) as being unpatentable over DeMarcken *et al.* in view of Sabre. More particularly, it is stated in the Office Action that DeMarcken *et al.* fail to disclose that the "subset of complete fare solutions is an exhaustive set of said complete fare solutions." However, it is asserted that Sabre discloses that the subset of complete fare solutions is an exhaustive set of said complete fare solutions, and that it would be

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obvious to one skilled in the art to combine the teachings of DeMarcken *et al.* and Sabre. Applicant respectfully disagrees, and asserts that DeMarcken *et al.* and Sabre, alone and in combination, fail to teach or suggest this element of Claims 4, 16, and 28.

Sabre, page 2, lines 18-19, page 3, lines 1-2, and page 4, lines 17-22 are cited in support of the assertion made in the Office Action. However, these passages of Sabre do not teach or suggest that the subset of complete fare solutions returned to the consumer is an **exhaustive** set of complete fare solutions, or in other words, **all of the complete fare solutions**. Instead, these passages of Sabre disclose that a "large number of possibilities can be considered without actually generating them." (Sabre, page 4, lines 19-20.) Applicant asserts that considering a large number of possibilities is clearly patentably distinguishable from returning an exhaustive set of complete fare solutions generated by the additive process of the present invention.

For the reasons described above, applicant asserts that DeMarcken *et al.* and Sabre, alone and in combination, fail to teach or suggest each element of Claims 4, 16, and 28. Accordingly, applicant respectfully requests that the 35 U.S.C. § 103(a) rejection of Claims 4, 16, and 28 be withdrawn, and the claims allowed.

(2) <u>Claims 5, 17, and 29</u>

Claims 5, 17, and 29, were rejected under 35 U.S.C. § 103(a) as being unpatentable over DeMarcken *et al.* in view of Sabre. It is asserted in the Office Action that Sabre discloses that "adding trip information and eliminating partial fare solutions are performed in a recursive manner." Applicant respectfully disagrees, and asserts that DeMarcken *et al.* and Sabre, alone and in combination, fail to teach or suggest the above recited element.

Page 9, lines 13-14, and page 10, lines 2-4, of Sabre are cited in support of the assertion made in the Office Action. However, while these passages of Sabre purportedly teach recursively **extracting** *complete* solutions from a virtual network structure, Sabre fails to

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disclose, teach, or suggest "**adding** trip information and eliminating *partial* fare solutions" in a recursive manner, as recited in Claims 5, 17, and 29. Applicant asserts that adding trip information and eliminating *partial* fare solutions in a recursive manner is entirely distinct from extracting *complete* solutions in a recursive manner.

For the additional reasons described above, applicant asserts that DeMarcken *et al.* and Sabre, alone and in combination, fail to teach or suggest each element of Claims 5, 17, and 29. Accordingly, applicant respectfully requests that the 35 U.S.C. § 103(a) rejection of Claims 5, 17, and 29 be withdrawn, and the claims allowed.

(3) Claims 6, 18, and 30

Claims 6, 18, and 30, were rejected under 35 U.S.C. § 103(a) as being unpatentable over DeMarcken *et al.* in view of Sabre. It is asserted in the Office Action that Sabre discloses that "adding trip information and eliminating partial fare solutions are performed in an iterative manner." Applicant respectfully disagrees, and asserts that DeMarcken *et al.* and Sabre, alone and in combination, fail to teach or suggest the above recited element.

Page 9, lines 18-22, of Sabre are cited in support of the assertion made in the Office Action. This passage of Sabre describes each successive recursive operation of a search as an "iteration," all in the context of **extracting** *complete* solutions **from** a virtual network structure. In contrast, Sabre fails to disclose, teach, or suggest **adding** trip information and eliminating *partial* fare solutions in an iterative manner. Applicant asserts that adding trip information and eliminating *partial* fare solutions in an iterative manner is entirely distinct from extracting *complete* solutions from a structure in an iterative manner.

For the additional reasons described above, applicant asserts that DeMarcken *et al.* and Sabre, alone and in combination, fail to teach or suggest each element of Claims 6, 18, and 30.

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Accordingly, applicant respectfully requests that the 35 U.S.C. § 103(a) rejection of Claims 6, 18, and 30 be withdrawn, and the claims allowed.

(4) Claims 7, 19, and 31

Claims 7, 19, and 31, were rejected under 35 U.S.C. § 103(a) as being unpatentable over DeMarcken *et al.* in view of Sabre. It is asserted in the Office Action that Sabre discloses that "said partial fare solutions are eliminated based on a threshold cost." Applicant respectfully disagrees, and asserts that DeMarcken *et al.* and Sabre, alone and in combination, fail to teach or suggest the above recited element.

Page 4, lines 17-23, page 9, lines 6-17, and page 11, lines 16-18, of Sabre are cited in support of the assertion made in the Office Action. These passages purportedly disclose a search algorithm that extracts *complete* solutions **from** a virtual network structure according to a lowest cost. However, contrary to the assertion made in the Office Action, these passages fail to disclose, teach, or suggest eliminating *partial* fare solutions based on a threshold cost, as recited in Claims 57, 19, and 31. Applicant asserts that extracting *complete* solutions from a structure according to a lowest cost is patentably distinguishable from eliminating *partial* fare solutions based on a threshold cost.

For the additional reasons described above, applicant asserts that DeMarcken *et al.* and Sabre, alone and in combination, fail to teach or suggest each element of Claims 7, 19, and 31. Accordingly, applicant respectfully requests that the 35 U.S.C. § 103(a) rejection of Claims 7, 19, and 31 be withdrawn, and the claims allowed.

(5) Claims 8, 20, and 32

Claims 8, 20, and 32, were rejected under 35 U.S.C. § 103(a) as being unpatentable over DeMarcken *et al.* in view of Sabre. It is asserted in the Office Action that Sabre discloses that

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"said partial fare solutions are eliminated based on a refined lower bound." Applicant respectfully disagrees, and asserts that DeMarcken *et al.* and Sabre, alone and in combination, fail to teach or suggest the above recited element.

Page 9, line 6 – page 12, line 11, of Sabre are cited in support of the assertion made in the Office Action. Similar to those passages of Sabre discussed above in regard to Claims 7, 19, and 31, these passages of Sabre discloses a search algorithm to extract *complete* solutions from a virtual network structure. Contrary to the assertion made in the Office Action, these passages do not disclose eliminating *partial* fare solutions based on a refined lower bound, as recited in Claims 8, 20, and 32. Applicant asserts that extracting the lowest priced *complete* solutions from a structure is patentably distinguishable from eliminating *partial* fare solutions based on a refined lower bound.

For the additional reasons described above, applicant asserts that DeMarcken *et al.* and Sabre, alone and in combination, fail to teach or suggest each element of Claims 8, 20, and 32. Accordingly, applicant respectfully requests that the 35 U.S.C. § 103(a) rejection of Claims 8, 20, and 32 be withdrawn, and the claims allowed.

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VIII. CLAIMS APPENDIX

1. In a communications network including a client and a query server computer, a method-for finding at least one best fare for a trip, the method comprising:

at the query server computer, in response to a fare query received from the client application:

determining a set of partial fare solutions for the trip;

adding trip information to the partial fare solutions in order to define a set of complete fare solutions for the trip;

as trip information is added to the partial fare solutions, eliminating partial fare solutions that are non-optimal partial solutions; and

returning a subset of said complete fare solutions as the best fares for the trip.

2. The method of claim 1, wherein adding trip information comprises:

supplying the fare query to a root node in a solution tree;

assigning fare components corresponding to said root node to a plurality of first nodes;

assigning at least one carrier corresponding to said first nodes to a plurality of second nodes;

assigning at least one flight corresponding to said second nodes to a plurality of third nodes;

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assigning at least one priceable unit corresponding to said third nodes to a plurality of fourth nodes; and

assigning at least one fare corresponding to said fourth nodes to a plurality of leaf nodes.

3. The method of claim 1, wherein said subset of complete fare solutions is a predetermined number of lowest cost fare solutions.

4. The method of claim 1, wherein said subset of complete fare solutions is an exhaustive set of said complete fare solutions.

5. The method of claim 1, wherein adding trip information and eliminating partial fare solutions are performed in a recursive manner.

6. The method of claim 1, wherein adding trip information and eliminating partial fare solutions are performed in an iterative manner.

7. The method of claim 1, wherein said partial fare solutions are eliminated based on a threshold cost.

8. The method of claim 1, wherein said partial fare solutions are eliminated based on a refined lower bound.

9. The method of claim 1, wherein said partial fare solutions are stored in a priority queue.

10. The method of claim 1, wherein said complete fare solutions are retrieved from a priority queue.

11. The method of claim 1, wherein adding trip information and eliminating partial fare solutions are performed as part of a branch-and-bound best fare search routine.

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12. The method of claim 1, wherein adding trip information and eliminating partial fare solutions are performed both backward and forward from a destination and origin.

13. A computer-readable medium containing computer-executable instructions, which, when executed by a query server in response to a fare query, carry out the method for finding at least one best fare for a trip, comprising:

determining a set of partial fare solutions for the trip;

adding trip information to the partial fare solutions in order to define a set of complete fare solutions for the trip;

as trip information is added to the partial fare solutions, eliminating partial fare solutions that are non-optimal partial solutions; and

returning a subset of said complete fare solutions as the best fares for the trip.

14. The computer-readable medium of claim 13, wherein adding trip information comprises:

supplying the fare query to a root node in a solution tree;

assigning fare components corresponding to said root node to a plurality of first nodes;

assigning at least one carrier corresponding to said first nodes to a plurality of second nodes;

assigning at least one flight corresponding to said second nodes to a plurality of third nodes;

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assigning at least one priceable unit corresponding to said third nodes to a plurality of fourth nodes; and

assigning at least one fare corresponding to said fourth nodes to a plurality of leaf nodes.

15. The computer-readable medium of claim 13, wherein said subset of complete fare solutions is a predetermined number of lowest cost fare solutions.

16. The computer-readable medium of claim 13, wherein said subset of complete fare solutions is an exhaustive set of said complete fare solutions.

17. The computer-readable medium of claim 13, wherein adding trip information and eliminating partial fare solutions are performed in a recursive manner.

18. The computer-readable medium of claim 13, wherein adding trip information and eliminating partial fare solutions are performed in an iterative manner.

19. The computer-readable medium of claim 13, wherein said partial fare solutions are eliminated based on a threshold cost.

20. The computer-readable medium of claim 13, wherein said partial fare solutions are eliminated based on a refined lower bound.

21. The computer-readable medium of claim 13, wherein said partial fare solutions are stored in a priority queue.

22. The computer-readable medium of claim 13, wherein said complete fare solutions are retrieved from a priority queue.

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23. The computer-readable medium of claim 13, wherein adding trip information and eliminating partial fare solutions are performed as part of a branch-and-bound best fare search routine.

24. The computer-readable medium of claim 13, wherein adding trip information and eliminating partial fare solutions are performed both backward and forward from a destination and origin.

25. A query server apparatus in a communications network for finding at least one best fare for a trip in response to a fare query, the apparatus comprising:

a processor; and

a memory, coupled to the processor, storing program code which, when executed by the processor and in response to the fare query, causes the query server apparatus to:

determine a set of partial fare solutions for the trip;

add trip information to the partial fare solutions in order to define a set of complete fare solutions for the trip;

as trip information is added to the partial fare solutions, eliminate partial fare solutions that are non-optimal partial solutions; and

return a subset of said complete fare solutions as the best fares for the trip.

26. The apparatus of claim 25, wherein adding trip information comprises:

supplying the fare query to a root node in a solution tree;

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assigning fare components corresponding to said root node to a plurality of first nodes;

assigning at least one carrier corresponding to said first nodes to a plurality of second nodes;

assigning at least one flight corresponding to said second nodes to a plurality of third nodes;

assigning at least one priceable unit corresponding to said third nodes to a plurality of fourth nodes; and

assigning at least one fare corresponding to said fourth nodes to a plurality of leaf nodes.

27. The apparatus of claim 25, wherein said subset of complete fare solutions is a predetermined number of lowest cost fare solutions.

28. The apparatus of claim 25, wherein said subset of complete fare solutions is an exhaustive set of said complete fare solutions.

29. The apparatus of claim 25, wherein adding trip information and eliminating partial fare solutions are performed in a recursive manner.

30. The apparatus of claim 25, wherein adding trip information and eliminating partial fare solutions are performed in an iterative manner.

31. The apparatus of claim 25, wherein said partial fare solutions are eliminated based on a threshold cost.

32. The apparatus of claim 25, wherein said partial fare solutions are eliminated based on a refined lower bound.

33. The apparatus of claim 25, wherein said partial fare solutions are stored in a priority queue.

34. The apparatus of claim 25, wherein said complete fare solutions are retrieved from a priority queue.

35. The apparatus of claim 25, wherein adding trip information and eliminating partial fare solutions are performed as part of a branch-and-bound best fare search routine.

36. The apparatus of claim 25, wherein adding trip information and eliminating partial fare solutions are performed both backward and forward from a destination and origin.

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IX. EVIDENCE APPENDIX

NONE

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X. RELATED PROCEEDINGS APPENDIX

NONE

Respectfully submitted,

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I hereby certify that this correspondence is being deposited in triplicate with the U.S. Postal Service in a sealed envelope as first class mail with postage thereon fully prepaid and addressed to Mail Stop Appeal Brief - Patents, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on the below date.

Date: May 16, 2005 Lori A. Lewis

TSP:lal

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